AMENDMENTS TO THE CLAIMS:

The following claims will replace all prior versions of the claims in this application (in the unlikely event that no claims follow herein, the previously pending claims will remain):

1. **(Currently Amended)** An adaptive resource allocation method in a multi-channel communication system, comprising:

determining, by an adaptive resource allocation processor, a subchannel channel gain according to channel quality; and

determining, by the adaptive resource allocation processor, a modulation method for each subchannel based on the channel gain,

wherein the determining of the modulation method includes:

allocating a number of bits to be transmitted to a subchannel according to the channel gain;

determining an optimal solution to ~~number of bits to~~ obtain minimum power for a total transmission rate according to the ~~determined optimum~~ number of bits; and

allocating a final number of bits to be transmitted for the subchannel according to the optimal ~~number of bits~~solution;

wherein the determining of the optimal solution includes adaptively performing a convex search in a recursive manner according to an average power and an object transmission rate R_t, and the final number of bits is determined based on a result of the convex search;

wherein the convex search includes solving a transmission rate non-constraint problem unil a Lagrange multiplier λ, corresponding to the object transmission rate R_t, is found;

wherein a less Lagrange multiplier λ is selected for the purpose of having a solution representing a higher transmission rate in a next step when a transmission rate for a predetermined solution, or a highest transmission rate for a plurality of solutions is less than the object transmission rate R_t, which is repeatedly performed until the Lagrange multiplier λ corresponding to the object transmission rate R_t is found.

2. (Previously Presented) The adaptive resource allocation method of claim 1, wherein, a Lagrange multiplier λ is analytically and experimentally estimated to determine the optimal number of bits.

3. **(Canceled)**.

4. **(Currently Amended)** The adaptive resource allocation method of ~~claim 3~~claim 1, wherein a relation between the average power and the object transmission rate R_t is represented as

$P(R)=\sigma^2\alpha^{-R}$ and $R>0$ with reference to a given channel response and a modulator, where P(R) denotes an average power-transmission rate function, σ^2 denotes a variance of radio wave signals, and α is greater than 1.

5. **(Currently Amended)** The adaptive resource allocation method of ~~claim 3~~claim 1, wherein the convex search process for searching an optimal solution λ^* for the object transmission rate R_t comprises:

a) respectively initializing a supremum λ_l and an infimum λ_u of the object transmission rate R_t to be 0 and ∞;

b) experimentally selecting an initial Lagrange multiplier estimate of λ for the object transmission rate R_t;

c) solving ~~a transmission~~the transmission rate non-constraint problem until a Lagrange multiplier λ corresponding to the object transmission rate R_t is found;

d) searching for a lowest transmission rate R_l and a highest transmission rate R_h; and

e) returning to solving the transmission rate non-constraint problem.

6. (Previously Presented) The adaptive resource allocation method of claim 5, wherein the initial Lagrange Multiplier value of λ satisfies:

$$\lambda = -\frac{\partial P(R)}{\partial R} = \alpha^{-R}\sigma^2 \ln \alpha$$

7-10. **(Canceled).**

11. **(Currently Amended)** The adaptive resource allocation method of ~~claim 10~~claim 5, wherein, in c) for solving the transmission rate non-constraint problem, a lowest transmission rate R_t and a highest transmission rate R_h are found when the initial estimate λ is a singular value.

12. **(Currently Amended)** The adaptive resource allocation method of claim 5~~claim 10~~, wherein, in c) for solving the transmission rate non-constraint problem, one transmission rate satisfying a relation of $R_l = R_h = R(\lambda)$ is found when the initial estimate λ is not a singular value.

13. **(Currently Amended)** The adaptive resource allocation method of claim 5~~claim 10~~, wherein, in d) for searching for the lowest transmission rate R_l and the highest transmission rate R_h, the initial estimate λ becomes the optimal value when a relation of $R_l \leq R_t \leq R_h$ (lowest transmission rate $\leq$ object transmission rate $\leq$ highest transmission rate) is given.

14. **(Currently Amended)** The adaptive resource allocation method of claim 5~~claim 10~~, wherein, in d) for searching for the lowest transmission rate R_l and the highest transmission rate R_h, a transmission rate $R_H(>R_h)$ in which a power reduction rate is maximized compared to the transmission rate increase at R_h and the supremum λ_u is updated with an inclination between R_h and R_H when a relation of $R_h < R_t$ (highest transmission rate < object transmission rate) is given.

15. (Original) The adaptive resource allocation method of claim 14, wherein the transmission rate R_H in which the power reduction rate is maximized is found by searching for available modulation methods having transmission rates greater than R_h.

16. (Original) The adaptive resource allocation method of claim 15, wherein the initial Lagrange multiplier estimate λ becomes the optimal solution when a relation of $R_h \leq R_t \leq R_H$ (highest transmission rate $\leq$ object transmission rate $\leq$ transmission rate in which the power reduction rate is maximized) is given.

17. (Original) The adaptive resource allocation method of claim 16, wherein the initial Lagrange multiplier estimate λ for a next process is estimated in an experimental manner when the infimum is 0, and the estimate Lagrange multiplier λ for a next process is calculated by the equation 14 or 15 when the infimum is not 0.

18. (**Currently Amended**) The adaptive resource allocation method of claim 5~~claim 10~~, wherein, in d) for searching for the lowest transmission rate R_l and the highest transmission rate R_h, the transmission rate $R_L(<R_l)$ in which the power reduction rate is maximized compared to the transmission rate increase at the lowest transmission rate R_l is found and the supremum λ_l is updated with an inclination between R_l and R_L when a relation of $R_l>R_t$ (lowest transmission rate > object transmission rate) is given.

19. (Original) The adaptive resource allocation method of claim 18, wherein the transmission rate R_L in which the power reduction is maximized is found by searching for available modulation methods having transmission rates less than R_l.

20. (Original) The adaptive resource allocation method of claim 19, wherein an initial Lagrange multiplier estimate λ becomes the optimal value when a relation of $R_L \leq R_t \leq R_l$ (transmission rate in which power reduction rate is maximized $\leq$ object transmission rate $\leq$ lowest transmission rate) is given.

21. (Original) The adaptive resource allocation method of claim 20, wherein the initial Lagrange multiplier estimate λ for a next process is estimated in an experimental way when the supremum λ_u is ∞, and the estimate Lagrange multiplier λ for a next process is calculated by the equation 14 or 15 when the supremum is not ∞.

22-23. (**Canceled**).

24. (**Currently Amended**) An adaptive resource allocation method in a multi-channel communication system, comprising:

a) allocating, by an adaptive resource allocation processor, a number of bits to be transmitted according to a subchannel quality;

b) determining, by the adaptive resource allocation processor, a minimum power for a total transmission rate;

c) determining, by the adaptive resource allocation processor, a channel gain for the subchannel according to the allocated number of bits and the power; and

d) determining, by the adaptive resource allocation processor, a modulation method for each subchannel based on the channel gain, comprising:

adaptively performing a convex search in the recursive manner according to the average power and an object transmission rate R_t; and

determining an initial Lagrange multiplier estimate of λ for the object transmission rate R_t, wherein the initial Lagrange Multiplier value of λ satisfies:

$$\lambda = -\frac{\partial P(R)}{\partial R} = \alpha^{-R}\sigma^{2}\ln\alpha$$

25. **(Canceled)**.